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Assessment of Qualification for Treatment under the Arizona Natural and Exceptional Events Policy for the High Particulate (PM_{10}) Concentration Events in the Phoenix and Yuma Areas on June 4, 2008

Background

The Arizona Department of Environmental Quality (ADEQ) issues Dust Control Action Forecasts for the Yuma and Phoenix areas as part of their Natural Events Action Plans. On Tuesday, June 3, 2008, in response to a deepening upper level trough of low pressure and an approaching dry surface cold front, ADEQ air quality forecasters issued the Maricopa County Dust Control Action Forecast calling for a moderate risk of wind-blown dust for Wednesday, June 4th, in Maricopa County. Because the tightening pressure gradient and dry cold front was expected to impact the Yuma area as well, ADEQ air quality forecasters called for a high risk of wind-blown dust in their Yuma and Vicinity Dust Control Action Forecast for Wednesday, June 4th. This potential wind event equated to a significant risk of exceeding the PM_{10} National Ambient Air Quality Standards (NAAQS) in both Yuma and Maricopa Counties. On the morning of June 4th, weather models predicted local wind gusts to be even stronger than the previous day's model runs had anticipated, prompting ADEQ forecasters to issue a same day PM_{10} Health Watch for Maricopa County stating that "Blowing and suspended dust, contributed to by strong and gusty gradient winds, may cause concentrations of coarse particles to approach unhealthy levels this afternoon and evening". The forecasts/advisories satisfy the requirement in 40 CFR 51.930(a)(1).

While the initial forecast for June 4th for both Maricopa County and Yuma called for sustained winds of 15-25 mph with the possibility for gusts over 30 mph, subsequent forecasts the morning of June 4th called for even stronger winds which prompted the Health Watch. Beginning in the early afternoon and continuing throughout the evening hours, strong southwesterly winds in Phoenix and strong westerly winds in Yuma generated areas of blowing dust. A detailed review of Best Available Control Measures (BACM) inspection reports was conducted for areas in the vicinity of the exceeding monitors (see attachment). Aside from the minor exceptions noted near the West 43rd and Coyote Lakes monitors, all appropriate State Implementation Plan (SIP) control measures were in place during the event, demonstrating per 40 CFR 50.1(j) that the event "is not reasonably controllable or preventable." A discussion of commonly employed BACM for dust in Maricopa and Yuma counties can be found in "High Wind Exceptional Events and Control Measures for PM_{10} Areas" (see "References").

The initialization of a wind-blown dust event is evident in the 6:00-6:30 p.m. Phoenix visible camera images, as well as the Arizona Meteorological Network (AzMET), Maricopa County (MC), ADEQ, and National Weather Service (NWS) monitors (see Fig. 1). This significant wind event brought elevated ambient concentrations of PM_{10} to the Phoenix and Yuma areas that exceeded the NAAQS at the Yuma Courthouse, Buckeye, West 43rd Ave. and Coyote Lakes monitors. The fact that ambient concentrations exceeded the NAAQS satisfies the criteria in 40 CFR 50.1(j) that the event "affects air quality."

The following are the key PM_{10} monitor readings for the monitors examined in this report.

Monitor (Operator/Type)	AQS ID	24-hr Avg PM_{10}	1-hr Max PM_{10}	Max Time	Flag**
YUMA AREA					
Yuma Courthouse (ADEQ/TEOM)	**04-027-0004***	**386**	**2341**	**2000**	**RJ**
BUCKEYE AREA					
Buckeye (MC/TEOM)	**04-013-4011***	**204**	**772**	**2300**	**RJ**
PHOENIX METRO AREA					
West 43rd Ave (MC/TEOM)	**04-013-4009***	**194**	**645**	**1400**	**RJ**
Coyote Lakes (MC/TEOM)	**04-013-4014***	**187**	**656**	**2300**	**RJ**

* EPA Air Quality System Identification Number
** 24-hr PM_{10} concentration influenced by natural or exceptional event to be flagged.
Type Abbreviations: BAM – Beta-Attenuation Mass Monitor (Continuous monitor)
TEOM – Tapered Element Oscillating Microbalance Monitor (Continuous monitor).

The preliminary findings from this analysis were presented at stakeholders meetings on November 19, 2008, and March 19, 2009, in Phoenix, Arizona. Following the stakeholders meetings, ADEQ supplemented and finalized the analysis and a public comment period was held from October 15, 2009 through November 13, 2009. This finalized document and any comments received are being submitted to EPA to satisfy the requirements in 40 CFR 50.14(c)(3)(i).

NWS-Luke AFB

Hr	T(F)	VR	Dust	Spd	Gust	Dir
1	75	10		0	0	N/A
2	80	10		8	8	SW
3	75	10		6	6	W
4	75	10		5	5	S
5	73	10		0	0	N/A
6	69	10		0	0	N/A
7	72	10		0	0	N/A
8	75	10	-DZ	3	3	VR
9	82	10		0	0	N/A
10	84	10	-DZ	11	16	S
11	88	10		20	25	SW
12	89	10		17	26	S
1	90	10		21	28	SW
2	92	10		23	32	SW
3	93	10		24	33	SW
4	93	10		26	36	SW
5	93	10		29	36	SW
6	92	10		28	36	SW
7	90	4	BLDU	25	36	SW
8	86	6	DU	24	33	SW
9	84	10		23	28	SW
10	82	10		21	21	SW
11	80	9		24	24	SW
12	78	6	HZ	23	23	SW

MC - BUCKEYE

21525 (112.62Wx33.37N)

Hr	T(F)	RH	PM	Spd	Max	Dir
1	72	29	44	1	4	N
2	70	32	36	0	5	N
3	70	32	37	0	5	NE
4	66	40	42	2	5	NE
5	65	41	45	3	6	NE
6	66	38	67	1	6	NE
7	70	39	116	1	4	NE
8	77	24	63	1	6	SE
9	83	18	44	6	19	S
10	86	15	19	10	20	SW
11	89	17	27	10	18	SW
12	91	18	34	14	26	SW
1	92	17	38	15	28	SW
2	93	19	48	17	29	SW
3	94	19	66	19	33	W
4	94	19	131	21	34	W
5	93	19	210	24	36	W
6	92	20	285	23	40	SW
7	89	22	411	21	36	SW
8	87	24	570	20	35	SW
9	84	25	515	15	29	SW
10	82	27	510	14	27	SW
11	80	29	759	17	28	SW
12	77	33	771	13	22	SW

Event Contrib. Analysis

Hourly PM_{10} Conc. ($\mu g/m^3$)

MONITORS:
1-BUCKEYE
2-W43RD
3-COYOTE

Hr	1	2	3
1	44.7	52	496
2	36.3	34	373
3	37.2	35	402
4	42.7	71	95.7
5	45.4	65	80.3
6	67.3	142	143
7	117	199	190
8	63.4	90	74
9	44.2	85	24.5
10	19	67	21.6
11	27.8	40	28
12	34.2	64	35.7
1	38.2	165	37.4
2	48.8	307	37.6
3	66.1	645	43
4	131	520	84.3
5	210	382	83.5
6	285	569	96.7
7	411	266	229
8	570	161	313
9	515	95	254
10	511	84	272
11	760	241	417
12	772	283	656

24-Hr. Avg PM_{10}

Monitor:	with Event	w/o Event
1-BUCKE	204	53
2-W43RD	194	78
3-COYOT	186	130

> NAAQS | < NAAQS

Pink=Event Contrib.

Conclusion: As shown above, the PM_{10} concentration would have been below the NAAQS "BUT FOR" the event contribution (hours highlighted in pink).

Event Contrib. Analysis

Hourly PM_{10} Conc. ($\mu g/m^3$)

MONITORS:
4-YUMA CH

Hr	1
1	48.7
2	44.7
3	44.3
4	105
5	18.4
6	37.5
7	33.2
8	46.4
9	42.3
10	69.2
11	42.1
12	50.6
1	75.9
2	119
3	183
4	570
5	301
6	547
7	570
8	2163
9	2341
10	965
11	523
12	343

24-Hr. Avg PM_{10}

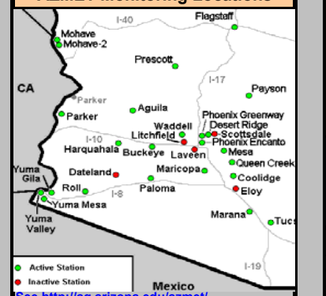
Monitor:	with Event	w/o Event
4-YUMA	386	55

> NAAQS | < NAAQS

Pink=Event Contrib.

Conclusion: As shown above, the PM_{10} concentration would have been below the NAAQS "BUT FOR" the event contribution (hours highlighted in pink).

AZMET Monitoring Locations



See http://ag.arizona.edu/azmet/

wnd @3m agl / Dir corrected to true north

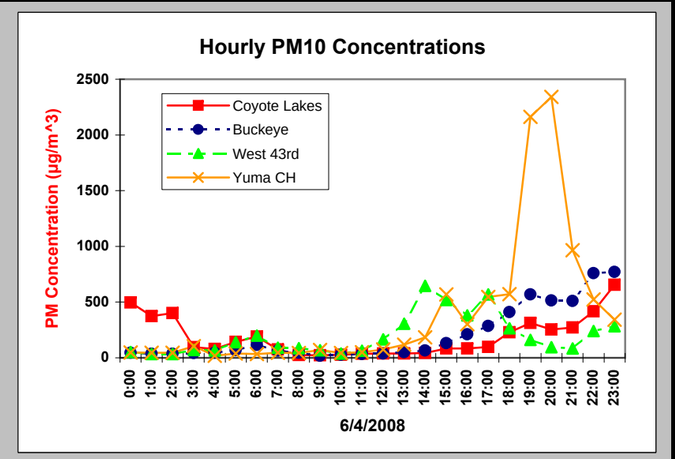
HIGHLIGHTING	Col.	Parameter
Max Wind	T(F)	Temp. (Deg. F.)
> 15 mph	RH	Rel Humidity %
>25 mph	Rn	Rain (Inches/hr)
HR - Time (End)	Spd	Avg Speed mph
A.M.	Max	Max Speed mph
P.M.	Dir	Wind Dir. (from)

Figure 1. Key Data for Event of June 4, 2008

WIND & PM10 DATA	ECA	KEY	PM10 PLOTS
	HIST DIST		Wx IMAGERY
			PHX VIS. CAMERAS

SUMMARY OF EVENT

At 2:00 pm, the Yuma area experienced westerly wind gusts up to 28 mph. Yuma had a visibility of 6 miles in blowing dust at 3:00 pm with westerly wind gusts between 22 and 41 mph. By 11:00 am, Luke AFB began experiencing gusts over 25 mph with blowing dust and reduced visibility by 7:00 pm.



MC - COYOTE LAKES

127530 (112.31Wx33.67N)

Hr	T(F)		PM	Spd	Max	Dir
1	71		495	2	5	NE
2	69		373	2	5	N
3	68		401	1	5	N
4	66		95	1	4	N
5	65		80	1	4	NE
6	65		143	2	5	N
7	72		189	2	5	NE
8	83		74	1	4	SE
9	87		24	2	6	S
10	89		21	5	16	SW
11	90		28	8	20	SW
12	91		35	9	21	SW
1	92		37	10	26	SW
2	94		37	11	26	SW
3	94		43	12	27	SW
4	96		84	14	32	SW
5	95		83	15	34	SW
6	94		96	14	30	SW
7	92		228	17	37	SW
8	88		312	10	30	SW
9	84		254	10	26	SW
10	82		271	11	25	SW
11	81		416	9	22	SW
12	79		656	9	24	SW

MC - WEST FORTY THIR

16659 (112.14Wx33.41N)

Hr	T(F)		PM	Spd	Max	Dir
1	80		51	3	7	S
2	77		33	1	8	NW
3	76		34	0	8	NW
4	72		71	3	8	E
5	71		65	4	7	NE
6	71		141	1	6	E
7	73		199	1	7	NE
8	78		89	5	9	E
9	82		85	3	9	E
10	87		67	0	9	W
11	91		39	4	16	SW
12	95		64	7	19	W
1	96		165	12	24	SW
2	95		306	14	27	SW
3	96		644	17	30	SW
4	96		520	17	36	SW
5	95		381	16	31	SW
6	94		569	16	35	SW
7	91		266	17	31	SW
8	88		161	17	30	SW
9	86		94	14	27	SW
10	84		84	14	30	SW
11	82		240	17	27	SW
12	79		283	16	29	SW

Historical Distribution

5-Yr. Dist. of Values ($\mu g/m^3$)

MONITORS:
1-BUCKEYE
2-WEST 43RD
3-COYOTE LAKES

Column Index
Yr - All Data (5-Yrs)
Sea - Data for Summer season only (5-Yrs)

Cum. Freq.	Mon 1 Yr	Mon 1 Sea	Mon 2 Yr	Mon 2 Sea	Mon 3 Yr	Mon 3 Sea
Min	5	14	5	16	7	10
0.5%	7	15	9	18	7	14
1.0%	9	15	11	18	9	17
2.5%	13	17	15	20	10	19
5%	16	21	19	24	14	19
10%	22	25	29	31	19	21
25%	33	34	44	40	30	31
50%	48	49	65	61	44	46
75%	67	68	91	82	58	62
90%	83	86	121	102	77	77
95%	98	101	139	127	91	102
97.5%	120	115	157	157	109	119
99.0%	159	131	192	251	122	138
99.5%	260	155	227	251	219	206
Max	289	195	313	251	313	273
Flagged Value	204		194		186	

Conclusion: Flagged Value is exceptional in nature (ie greater than 95% of all data)

Historical Distribution

5-Yr. Dist. of Values ($\mu g/m^3$)

MONITORS:
4-YUMA CH

Column Index
Yr - All Data (5-Yrs)
Sea - Data for Summer season only (5-Yrs)

Cum. Freq.	Mon 1 Yr	Mon 1 Sea
Min	8	13
0.5%	12	16
1.0%	14	16
2.5%	16	20
5%	19	20
10%	23	25
25%	31	34
50%	42	43
75%	57	62
90%	77	85
95%	96	102
97.5%	127	132
99.0%	186	165
99.5%	211	193
Max	349	224
Flagged Value	386	

Conclusion: Flagged Value is exceptional in nature (ie greater than 95% of all data)

MC - DURANGO COMPLEX

16375 (112.12Wx33.43N)

Hr	T(F)		PM	Spd	Max	Dir
1	77		28	2	6	S
2	75		53	1	5	NE
3	74		45	1	7	NE
4	72		46	2	6	E
5	71		50	2	6	NE
6	70		49	4	9	E
7	73		55	4	11	E
8	79		55	5	10	E
9	86		49	3	9	E
10	90		46	2	9	SE
11	92		35	3	11	S
12	94		29	4	20	W
1	94		53	11	25	W
2	94		77	12	27	W
3	95		189	16	32	W
4	96		217	15	31	SW
5	95		166	15	33	W
6	94		154	15	33	W
7	91		133	14	28	SW
8	87		113	12	26	SW
9	85		79	12	25	SW
10	83		69	12	28	SW
11	81		210	15	28	SW
12	79		237	12	28	SW

MC - CENTRAL PHOENIX

16329 (112.05Wx33.46N)

Hr	T(F)		PM	Spd	Max	Dir
1	78		42	2	8	SE
2	74		41	4	8	E
3	72		36	4	10	E
4	71		39	4	9	E
5	70		41	4	8	E
6	70		46	4	8	E
7	76		52	5	9	E
8	80		36	6	12	E
9	85		36	5	10	E
10	90		37	2	9	E
11	92		32	5	15	SW
12	93		28	5	16	SW
1	93		34	9	24	W
2	94		64	13	28	W
3	94		163	16	34	W
4	93		204	17	33	W
5	94		141	18	34	W
6	92		166	17	37	W
7	90		180	17	34	SW
8	87		135	16	31	SW
9	85		102	17	32	W
10	84		76	15	28	W
11	81		177	15	31	SW
12	79		303	16	33	W

NWS-Yuma MCAS

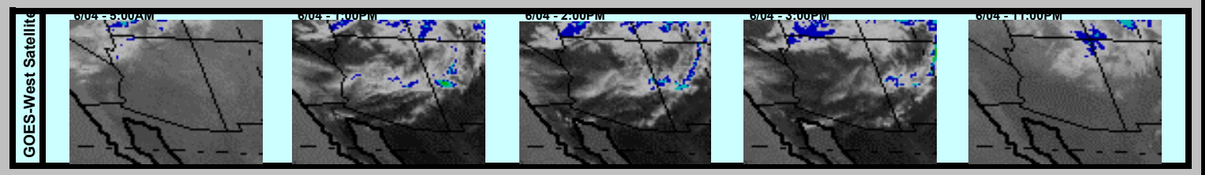
Hr	T(F)	VR	Dust	Spd	Gust	Dir
1	77	10		3	3	S
2	79	10		0	0	N
3	75	10		3	3	S
4	76	10		3	3	NW
5	75	10		8	8	W
6	74	10		5	5	NW
7	77	10		7	7	NW
8	80	10		13	13	W
9	83	10		7	7	W
10	86	10		5	5	SW
11	91	10		3	3	VR
12	95	10		15	22	SW
	97	10		10	10	SW
2	100	10		22	28	W
3	100	6	BLDU	22	29	W
4	98	10		17	28	W
5	96	6	HZ	24	37	W
6	93	10	HZ BL	23	30	W
7	88	3	HZ BL	22	33	NW
8	81	10	HZ BL	23	36	W
9	77	0.5	HZs	22	39	NW
10	75	10	HZ BL	20	31	NW
11	75	5	BLDU	14	20	W
12	75	10	BLDU	11	23	W

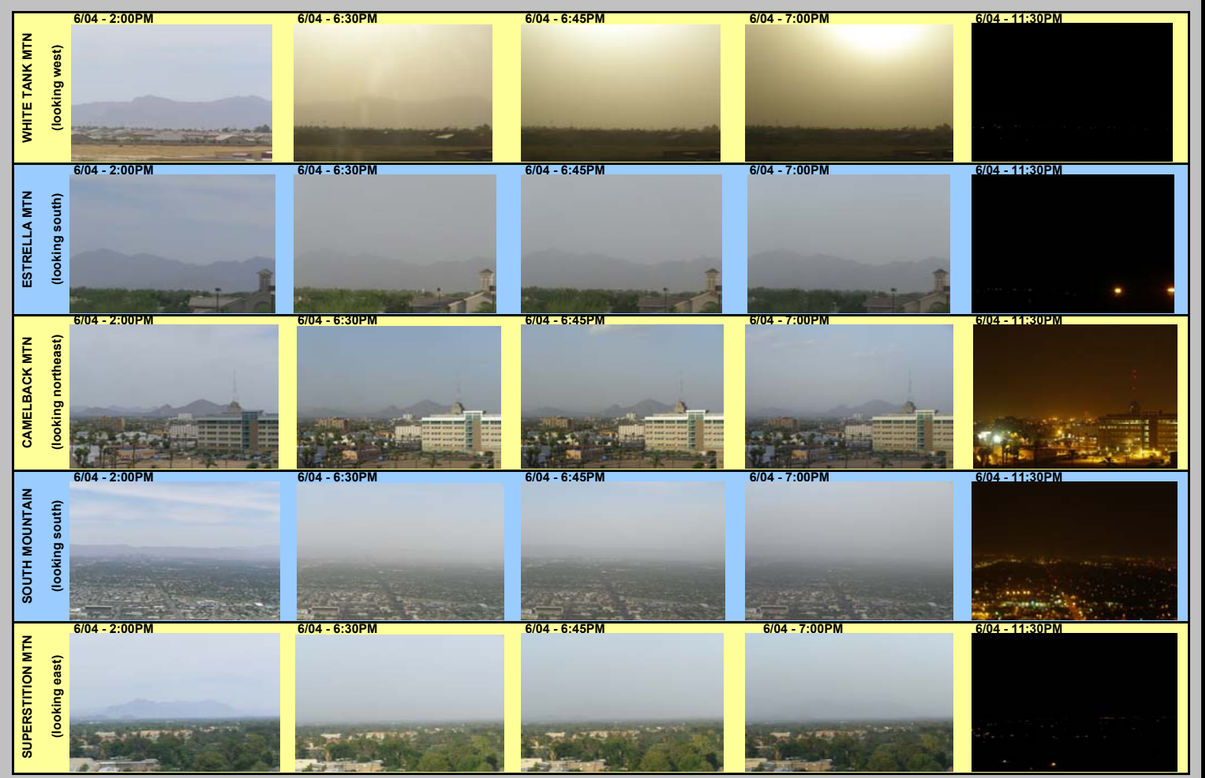
ADEQ - YUMA AGRI CEN

128530 (114.71Wx32.71N)

Hr	T(F)	RH		Spd	Max	Dir
1	75	27		2	8	W
2	73	29		2	9	NW
3	69	37		4	8	S
4	66	44		3	7	S
5	63	48		4	9	S
6	66	38		3	5	S
7	69	38		2	6	SW
8	74	32		5	12	W
9	77	25		6	11	W
10	82	22		8	15	W
11	85	19		9	16	SW
12	89	18		11	20	SW
1	92	17		12	21	SW
2	94	15		16	28	W
3	94	15		18	34	W
4	92	15		20	33	W
5	91	16		19	32	W
6	88	20		15	26	W
7	85	23		18	29	W
8	79	29		26	38	W
9	75	35		25	40	W
10	73	37		26	40	W
11	72	37		21	29	NW
12	72	35		15	28	W

GOES-West Satellite





Prepared by S. Kendall, A. Juniel, B. Busby and B. Paris/ ADEQ 3/19/09

Assessment under the Technical Criteria Document (TCD)

1. Properly qualify and validate the air quality measurement to be flagged. As this was not a filter sampling date (1-in-6 run day), only data from the continuous analyzers were examined. The air quality monitoring data were reviewed by the agency responsible for operation of the monitor. All hourly PM_{10} readings from the Yuma Courthouse, Buckeye, West 43rd Ave. and Coyote Lakes monitoring sites were valid for June 4th. Audits of the analyzers revealed operations were within acceptable tolerance.

2. Review suspected contributing sources. The NWS, AzMET, and MC surface data for Arizona provide a good explanation as to what meteorological conditions were in place on June 4th. Strong southwesterly winds were occurring in the Phoenix area due to a low pressure system approaching from the northwest with a cold front passing over Arizona. PM_{10} concentrations were elevated throughout much of the Phoenix Metro area as evidenced by the PM_{10} and wind speed plots (see attachments). PM_{10} concentrations also spiked at Yuma Courthouse during the afternoon and evening hours as winds increased out of the west and northwest in Yuma. The plot of hourly PM_{10} concentration data in the upper right corner of Figure 1 confirm the nearly identical timing of the elevated PM_{10} concentrations recorded at West 43rd Ave., Coyote Lakes, Buckeye, and Yuma. Phoenix visibility camera images show the reduced visibility associated with this high wind event. These images indicate that reduced visibilities due to blowing dust were widespread throughout the entire Valley. While this visual evidence is not possible for the Yuma area, Yuma radar data show the transport of blowing dust from southeastern California into southwestern Arizona (see attachment for more detail).

3. Examine all air quality monitoring information. Data from all monitors in the network were reviewed. Monitors from the affected areas are summarized in the table in the Background section of this assessment. Pursuant to 40 CFR 50.14(c)(3)(iii)(C), the "Historical Distribution" Table in Figure 1 has been included to demonstrate that the event is associated with a measured concentration in excess of normal historical fluctuations, including background (i.e., concentrations greater than the 95th percentile). Additionally, the winds associated with the elevated PM_{10} concentrations may be characterized as 'unusual' as described in "Impact of Exceptional Events' 'Unusual Winds' on PM_{10} Concentrations" (see "References").

4. Examine the meteorological conditions before and during the event. The meteorological data are summarized in Figure 1. The wind data are highlighted yellow if the max wind speed in the hour exceeds 15 mph and orange if it exceeds 25 mph. As can be seen in Figure 1, wind speeds did not pick up in central and southern Arizona until approximately noon, when several stations began reporting wind gusts of 20 mph or greater. As winds continued to increase through the afternoon, the onset of elevated PM_{10} concentrations began at the four flagged monitoring sites, each of which continued to show higher PM_{10} values as winds increased throughout the day. Apart from a two hour lull in PM_{10} concentrations at West 43rd Ave. around 9:00 p.m., elevated concentrations at each flagged monitoring site continued throughout the evening.

5. Perform a qualitative attribution to emission source(s). All evidence indicates the elevated PM_{10} concentrations in the Phoenix and Yuma areas can be attributed to soil emissions that were transported over portions of Maricopa County and Yuma County. No source specific emission allocation is possible based on the data available for analysis. Visual evidence of reduced visibility during the 6:00 p.m. hour can be seen in the images located in the lower right portion of Figure 1. These images provide proof that the elevated PM_{10} concentrations in and round Phoenix were coincident with strong, gusty winds and can be attributed to soil emissions. In addition, visibility was reduced to 0.5 miles with haze and blowing dust reported by trained weather spotters at the Yuma MCAS during the afternoon and evening hours of June 4. These observations provide further evidence that the elevated PM_{10} concentrations recorded at Yuma Courthouse were the result of a wind-blown dust event.

6. Estimation of Contribution from Source or Event. The primary source appears to be wind-blown dust over central and southern Arizona for which there is not an effective or efficient method to estimate the relative contributions from specific sources. The demonstration analysis contained in this report establishes the linkage between the measurements to be flagged and the event, thus satisfying the requirement in 40 CFR 50.14(c)(3)(iii)(B). Pursuant to 40 CFR 50.14(c)(3)(iii)(D), the "Event Contrib. Analysis" Table in Figure 1 has been included to demonstrate that there would have been no exceedances or violations but for the event (i.e., the contribution during the event overwhelmed the 24-hour averages).

7. Determination that a Natural or Exceptional Event Contributed To an Exceedance. Based on this analysis, the event satisfies the requirement in 40 CFR 50.1(j) that the elevated concentrations at Yuma Courthouse, Buckeye, West 43rd Ave., and Coyote Lakes were attributed to a natural event.

Conclusion

Transport of dust from soils by high winds. The region wide elevated PM_{10} event on June 4, 2008, in Yuma and Maricopa Counties was the result of transported dust and soils from winds that suspended natural soils and soils from areas where Best Available Control Measures are in place and should be flagged for air quality planning purposes. The "high wind" (RJ) flag should be applied to the monitor readings indicated in the table at the beginning of this report, as the monitor would have been below the NAAQS but for the contribution of the event.

ATTACHMENTS AND REFERENCES

FOR EXCEPTIONAL EVENTS ANALYSIS

The following are supplemental materials helpful in understanding the exceptional event summarized in the main report. In addition, the reader is referred to the following references.

REFERENCES

Arizona Department of Environmental Quality (ADEQ), *Air Quality Exceptional and Natural Events Policy*, Policy Number 2009.002 (April 28, 1999; revised January 10, 2006 and June 22, 2007).

Arizona Department of Environmental Quality (ADEQ), *Technical Criteria Document for Determination of Natural Exceptional Events for Particulate Matter Equal to or Less Than Ten Microns in Aerodynamic Diameter (PM_{10})* (May 31, 2000).

Arizona Department of Environmental Quality (ADEQ), *Technical Criteria Document for Determination of Natural and Exceptional Events* (December 12, 2005).

Arizona Department of Environmental Quality (ADEQ), *Impact of Exceptional Events 'Unusual Winds' on PM_{10} Concentrations* (October 14, 2009).

Arizona Department of Environmental Quality (ADEQ), *High Wind Exceptional Events and Control Measures for PM_{10} Areas* (October 14, 2009).

Environmental Protection Agency (EPA), *The Treatment of Data Influenced by Exceptional Events (Exceptional Event Rule)*, 73 FR 70597; 40 CFR Parts 50 and 51 (November 21, 2008).

ADEQ
Arizona Department of Environmental Quality
Janet Napolitano, Governor
Stephen A. Owens, ADEQ Director

ADEQ AIR POLLUTION HEALTH WATCH ISSUANCE NOTICE

Issuance Date and Time:	Wednesday, June 04, 2008 6:15 a.m.
Valid for Date(s):	Wednesday June 04, 2008
Pollutant:	COARSE PARTICLES (PM-10)
Message:	Blowing and suspended dust, contributed to by strong and gusty gradient winds, may cause concentrations of coarse particles to approach unhealthy levels this afternoon and evening.

Detailed air quality forecast information is available on:

- The internet at www.azdeq.gov
- A telephone recording at 602-771-2367

Duty Forecaster:	Christopher Reith	602-771-2360
	Joe Paul	602-771-2363

CKR 05/01/2007

ADEQ Arizona Department of Environmental Quality

Janet Napolitano, Governor
Stephen A. Owens, ADEQ Director

MARICOPA COUNTY
DUST CONTROL ACTION FORECAST
ISSUED TUESDAY, JUNE 02, 2008
Three-day weather outlook:

On Wednesday an upper level trough in the mid-latitude storm track will deepen over the western U.S. including Arizona. Increasing afternoon winds are therefore expected on Wednesday when gradients will be the strongest. There will be an increased risk for areas of blowing dust after the noon hour lasting into the evening hours.

R I S K F A C T O R S

	WINDS		STAGNATION		RISK LEVEL
Day #1: Wed 06/04/2008	Southwest to westerly 15-25 mph with gusts over 30 mph by afternoon.	+	Rather stagnant during the morning hours with improvement by afternoon.	=	**MODERATE**
Day #2: Thu 06/05/2008	West to northwesterly 10-20 mph.	+	Rather stagnant during the morning hours with improvement by afternoon.	=	**LOW**
Day #3: Fri 06/06/2008	Southwesterly 5-15 mph by afternoon.	+	Rather stagnant during the morning hours with improvement by afternoon.	=	**LOW**

The Maricopa County Dust Control Action Forecast is issued to assist in the planning of work activities to help reduce dust pollution. To review the complete air quality forecast for the Phoenix metropolitan area and the health effects of air pollution, please see ADEQ's Air Quality Forecast at http://www.azdeq.gov/environ/air/ozone/ensemble.pdf, or call 602-771-2367 for recorded forecast information.

ADEQ Arizona Department of Environmental Quality

Janet Napolitano, Governor
Stephen A. Owens, ADEQ Director

YUMA AND VICINITY
DUST CONTROL ACTION FORECAST
ISSUED TUESDAY, JUNE 03, 2008

Three-day weather outlook:

On Wednesday an upper level trough in the mid-latitude storm track will deepen over the western U.S. including Arizona. Increasing afternoon winds are therefore expected the next few days – but especially on Wednesday – when gradients will be the strongest. There will be a HIGH risk for localized (not widespread) blowing dust after the noon hour lasting into the evening hours.

	WINDS	WIND-BLOWN DUST RISK
Day #1: Wed 06/04/2008	Westerly 15-25 mph with gusts to 30 mph by afternoon.	**HIGH**
Day #2: Thu 06/05/2008	Northwest to northerly 10-20 mph with a few higher gusts, decreasing by afternoon.	**MODERATE**
Day #3: Fri 06/06/2008	No significant winds expected.	**LOW**

PM-10 & PM-2.5 (PARTICLES)

Description – The term "particulate matter" (PM) includes both solid particles and liquid droplets found in air. Many manmade and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. Particles less than 10 micrometers in diameter tend to pose the greatest health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter are referred to as "fine" particles and are responsible for many visibility degradations (brown cloud). Particles with diameters between 2.5 and 10 micrometers are referred to as "coarse".

Sources – Fine = All types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. Coarse = crushing or grinding operations and dust from paved or unpaved roads.

Potential health impacts – PM can increase susceptibility to respiratory infections and can aggravate existing respiratory diseases, such as asthma and chronic bronchitis.

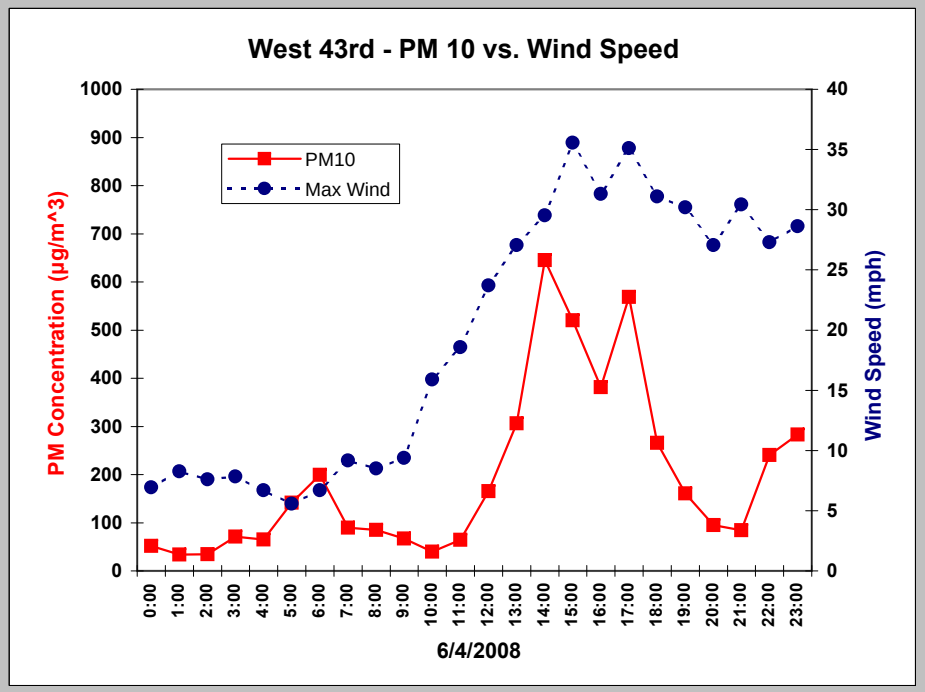
Units of measurement – Micrograms per cubic meter (ug/m3)

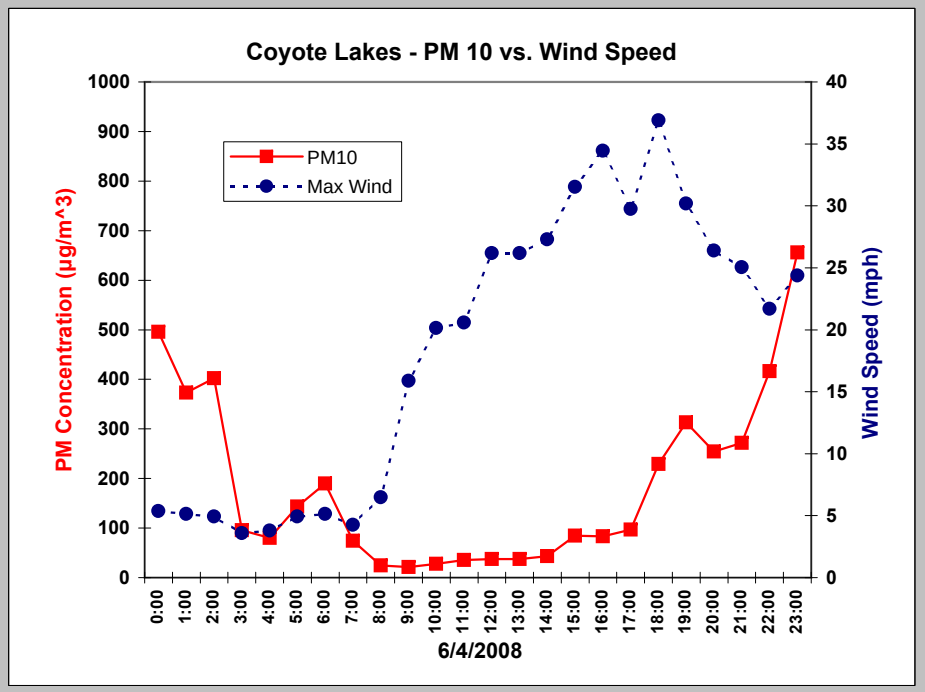
Averaging interval – 24 hours (midnight to midnight).

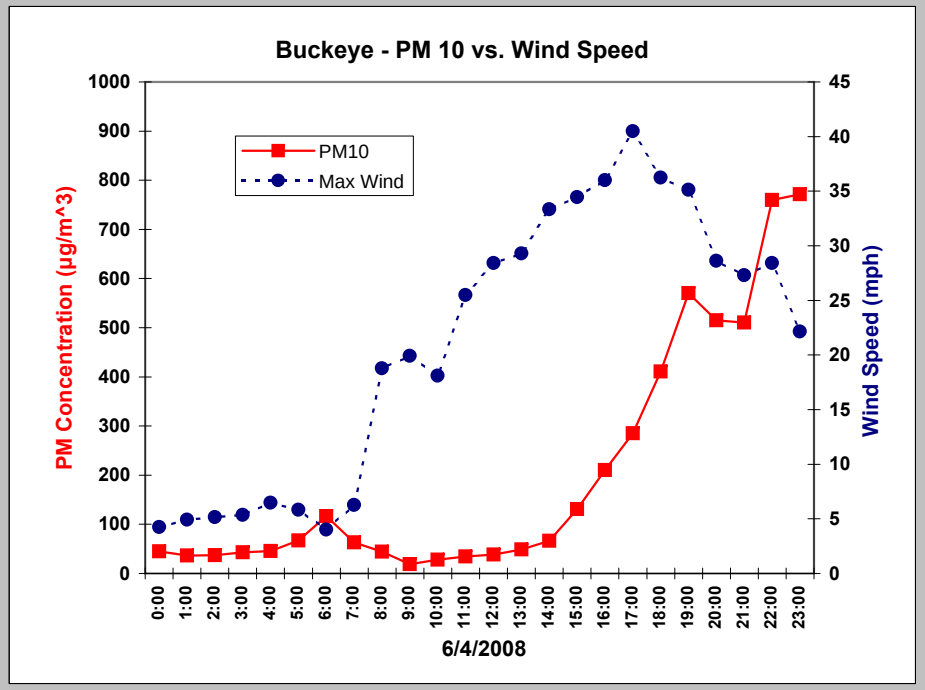
Reduction tips – Stabilize loose soils, minimize travel on dirt roads, utilize tarps on haul trucks, limit use of leaf-blowers, and on high-wind days reduce outdoor activities.

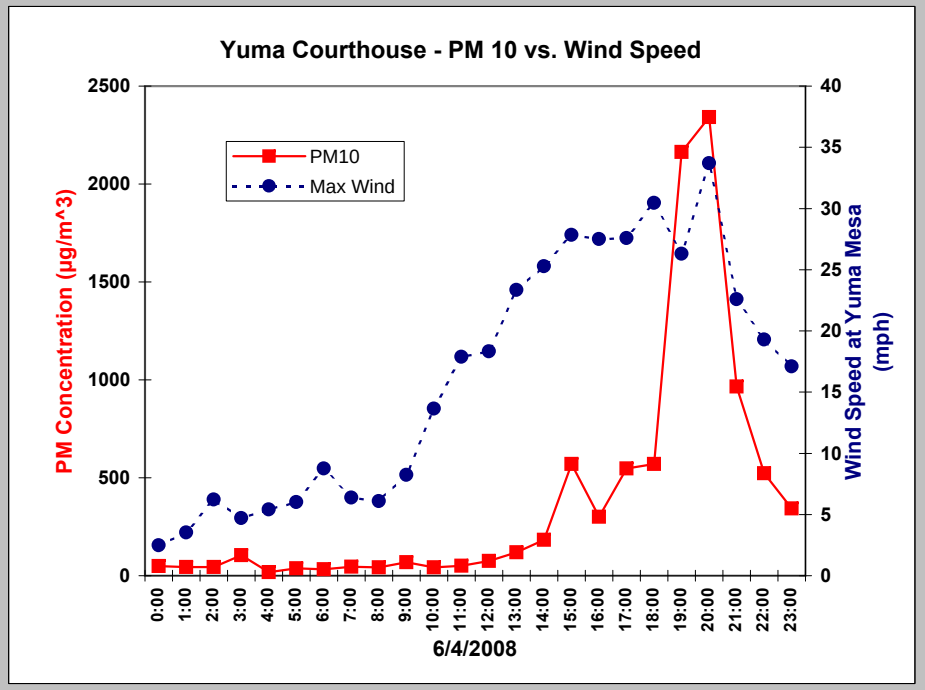
CKR 05/09/2005

06/04/2008 - ADDITIONAL GRAPHS 1

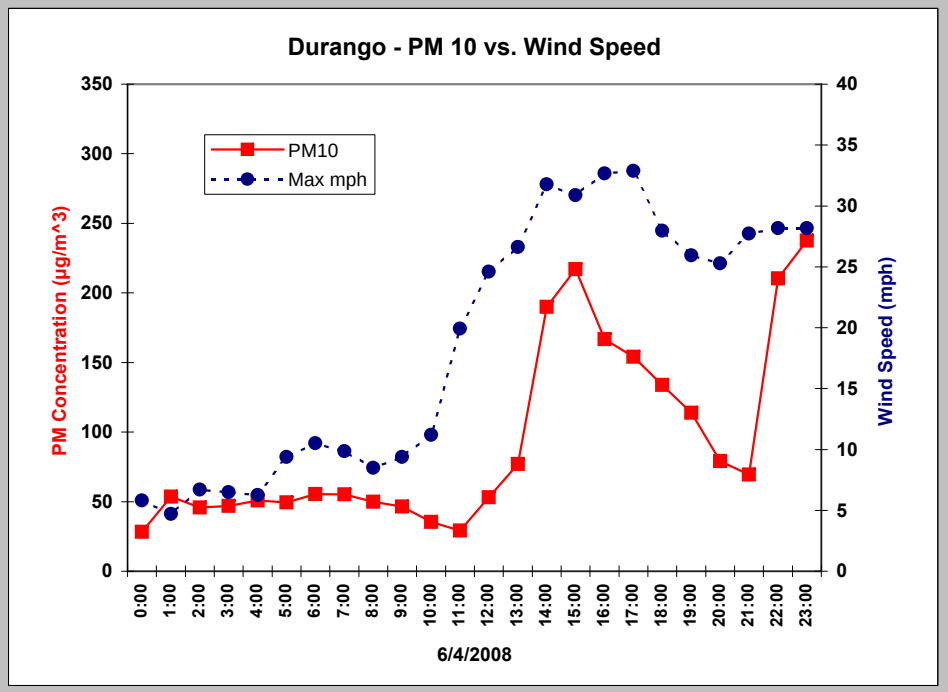


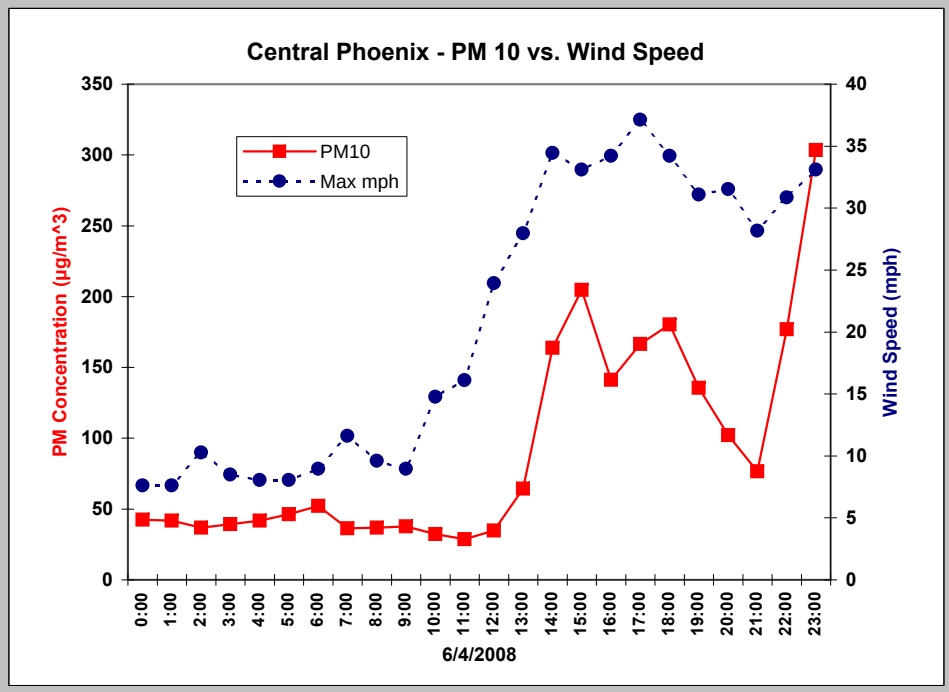


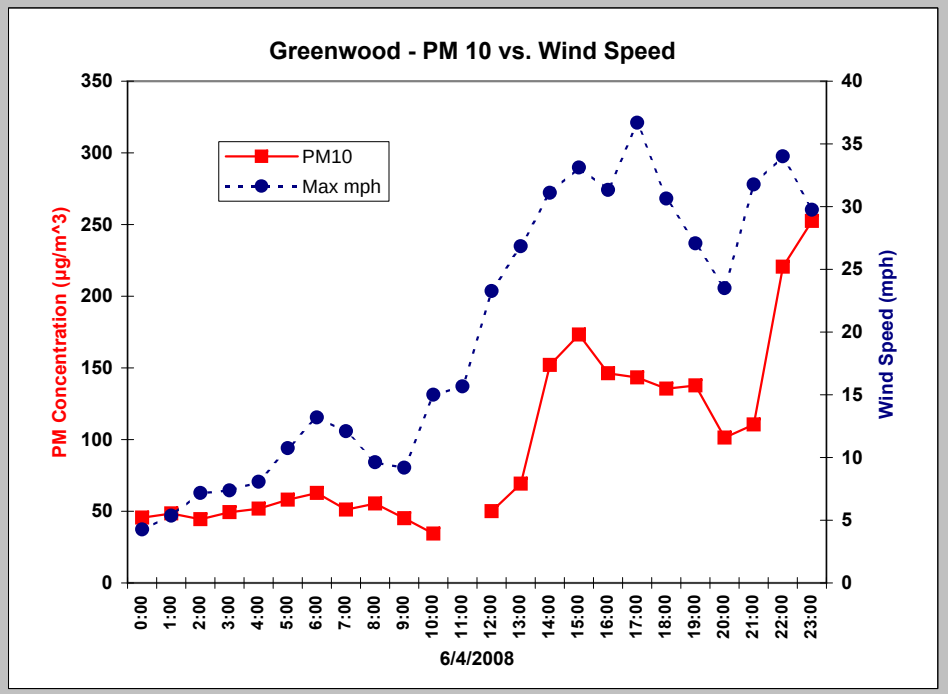


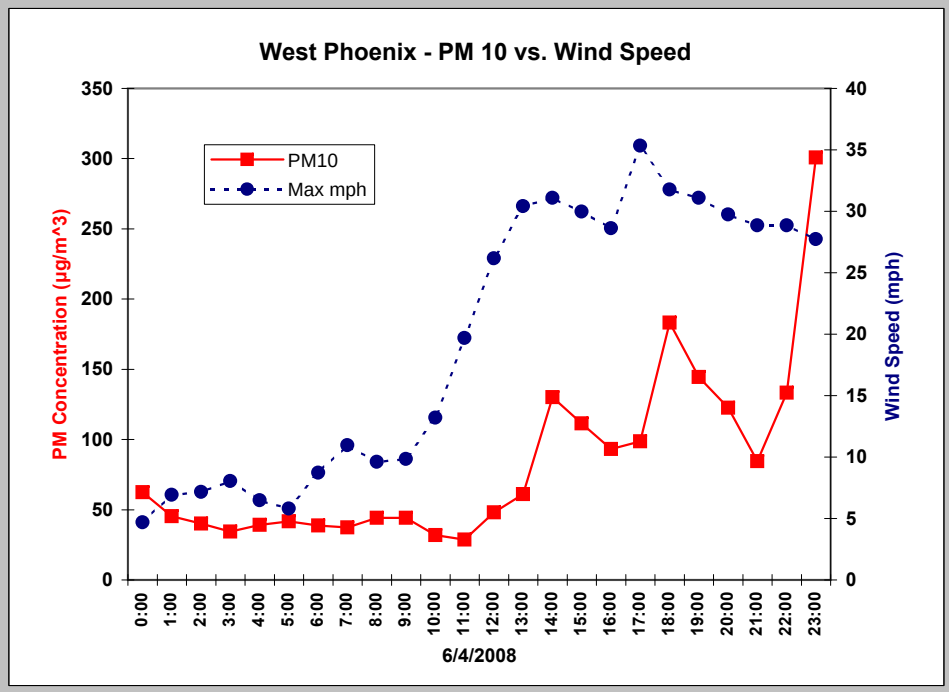


06/04/2008 - ADDITIONAL GRAPHS 2

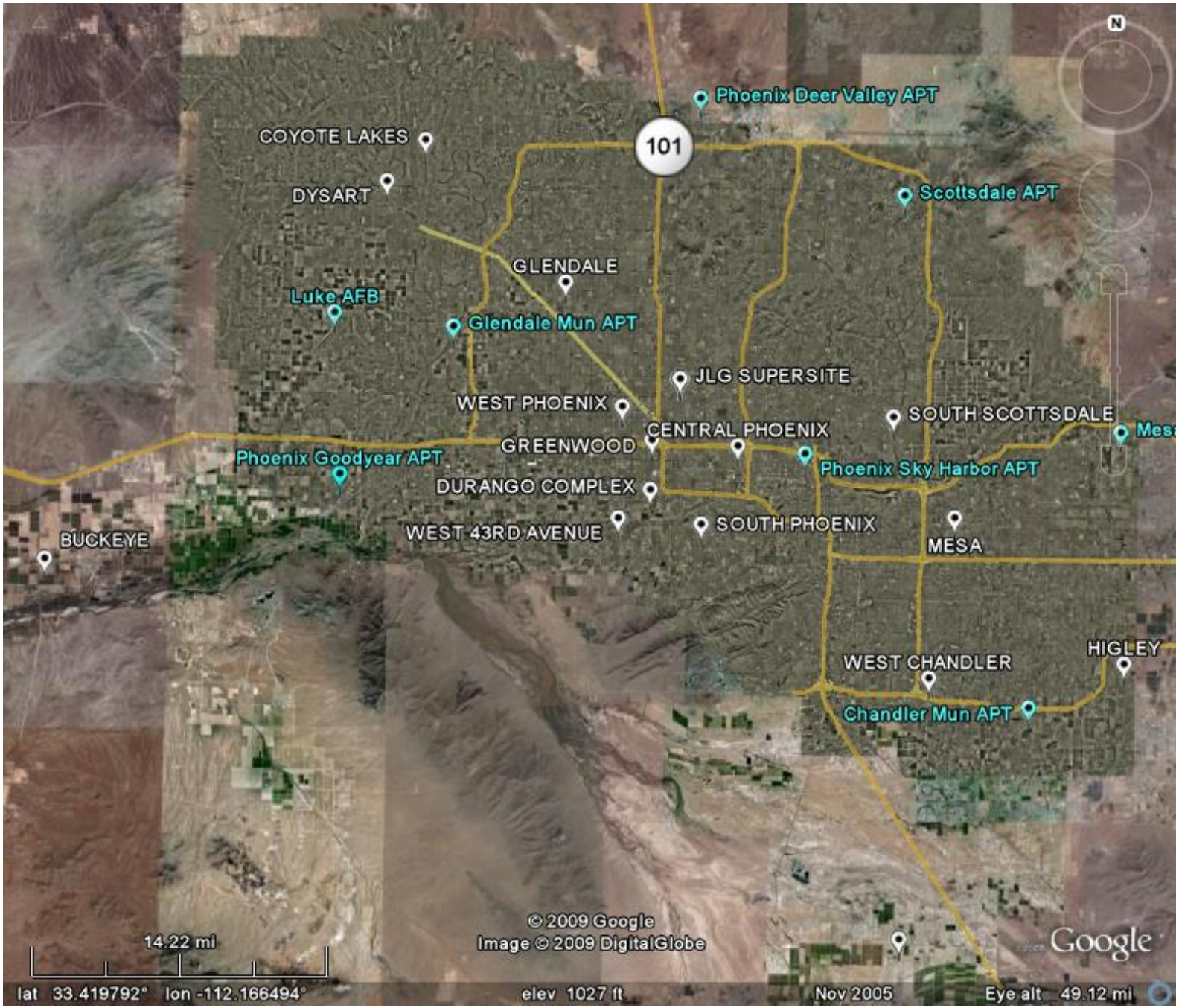






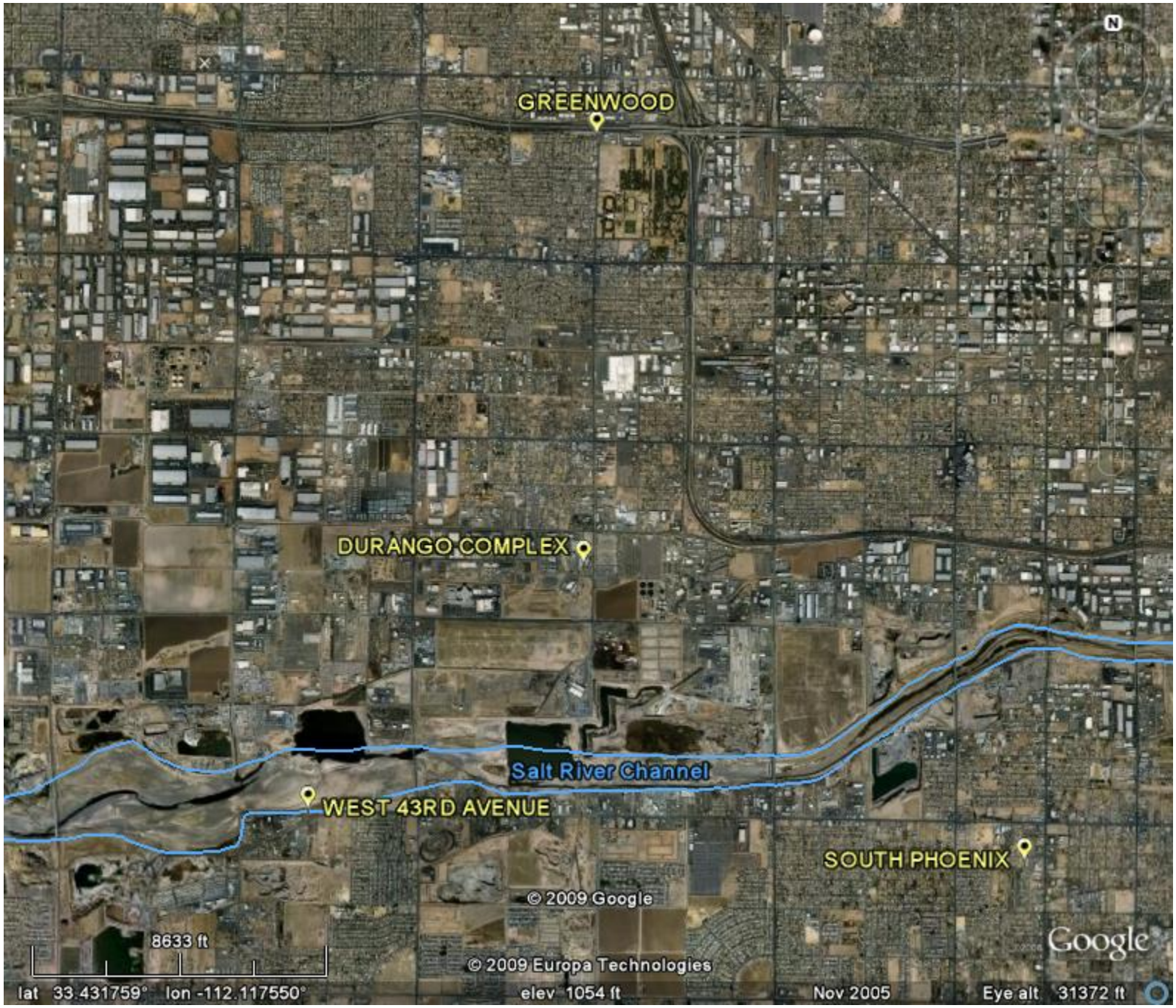


Phoenix Area PM_{10} and Meteorological Monitors



Source: US EPA, ADEQ, & Google Earth

Salt River Area PM_{10} and Meteorological Monitors



Source: US EPA, ADEQ, & Google Earth

Yuma Area PM_{10} and Meteorological Monitors

Source: US EPA, ADEQ, & Google Earth

June 4th 2008 Radar and Satellite Data

Radar data obtained from the National Oceanic and Atmospheric Administration's National Climatic Data Center in conjunction with MODIS satellite photography obtained from NASA's Rapid Response System allows for a visual reassessment of the event. These data were downloaded as KMZ files and displayed using Google Earth software. The overlay of the products clearly shows that much of the suspended dust originated in southeastern California and was transported to the east. It can be seen that large sources of dust appear to come from the Imperial Sand Dunes of southern California (also known as the Algodones Dunes) and other similar dunes or open desert areas to the southwest of the Salton Sea. Another common source of blowing dust appears to be an area of open desert to the south / southeast of Yuma. While some of the radar images are obscured by noise, the dust sources are still clearly visible.

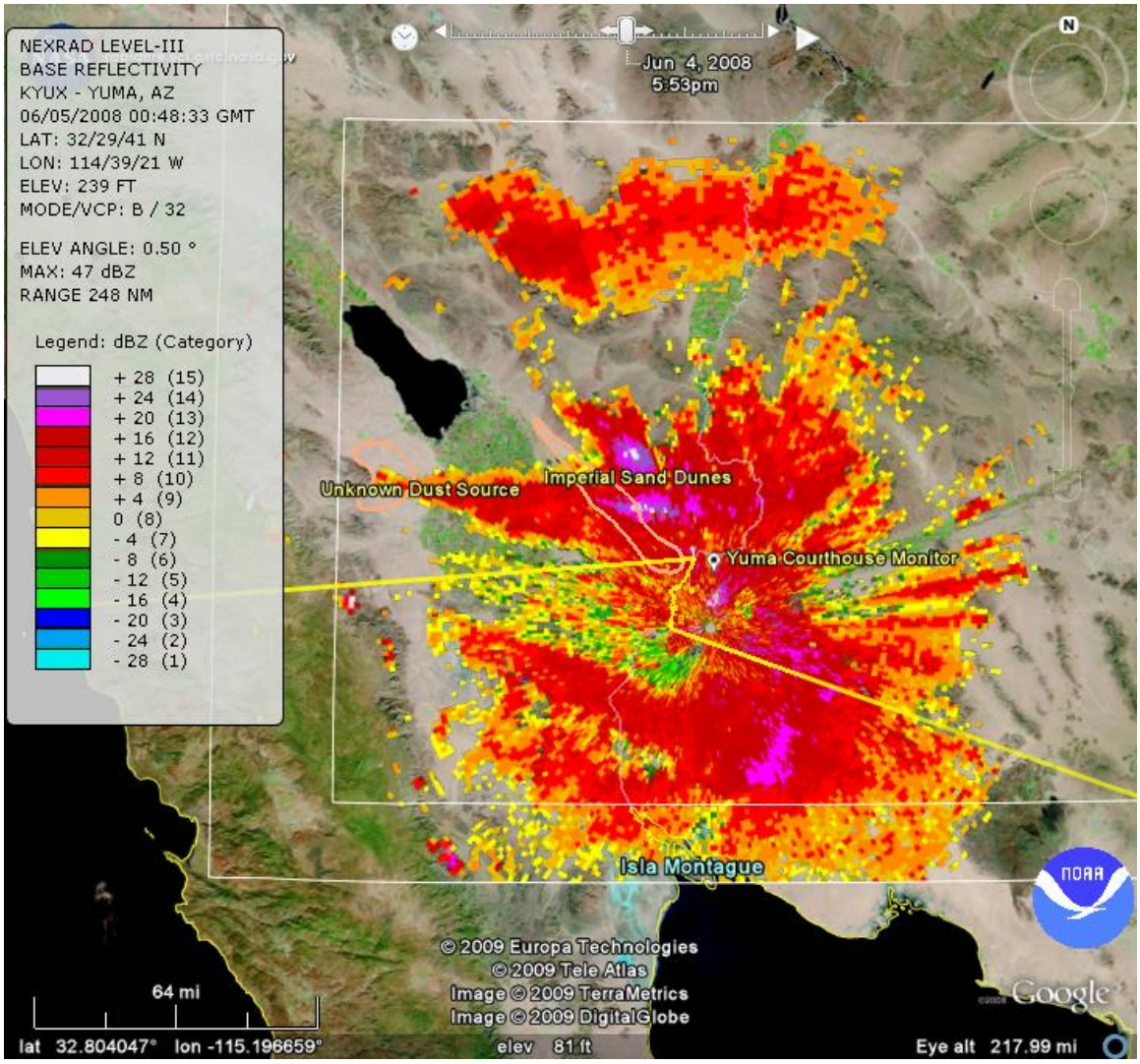


Figure 1 - Radar data and MODIS satellite imagery show a major source of blowing dust located to the southwest of the Salton Sea.

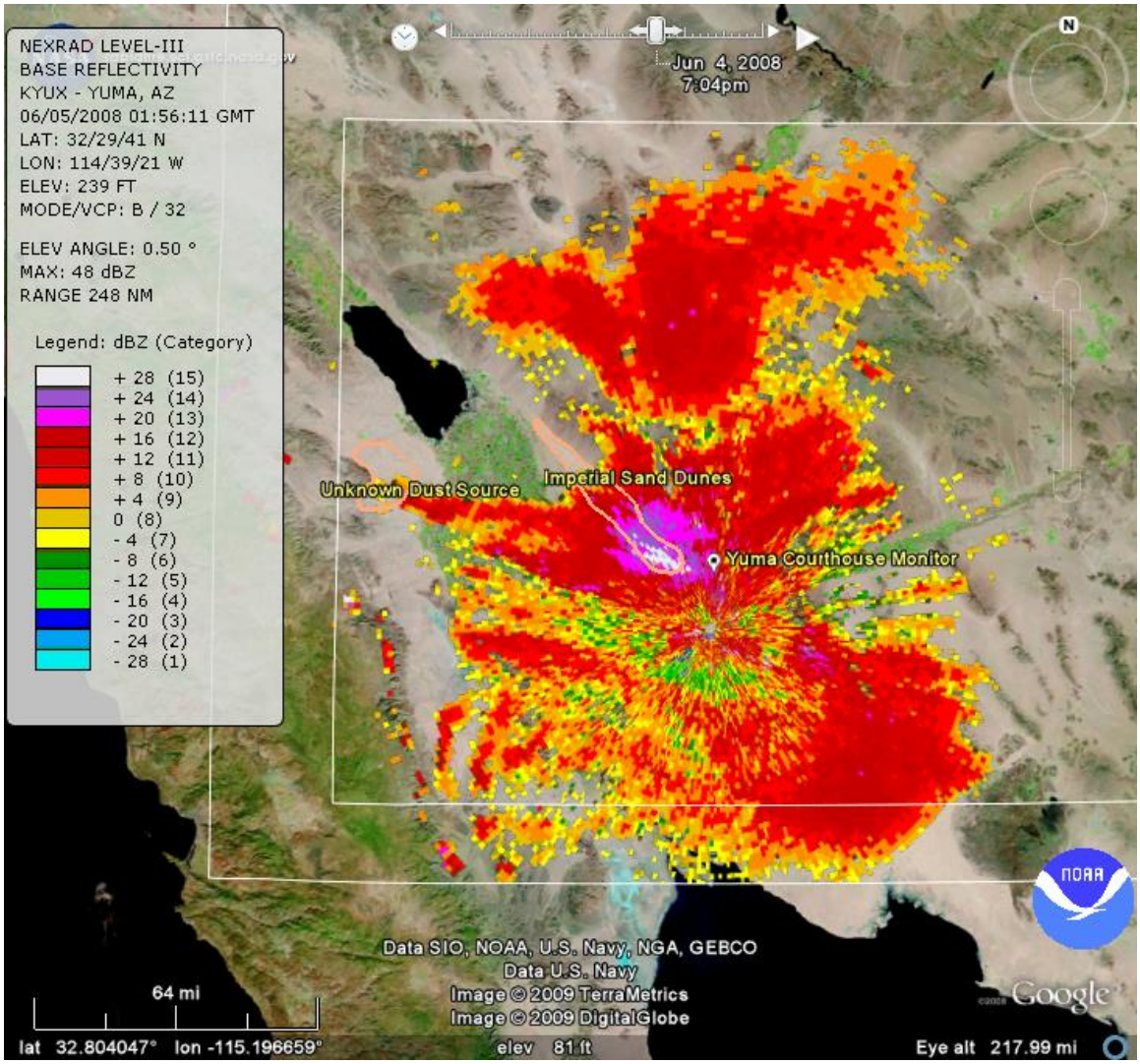


Figure 2 – Just prior to the time of highest PM_{10} concentrations in the Yuma area, radar data show what are likely high concentrations of blowing dust to the west / northwest of Yuma. These returns (shown as white colors) are likely indicative of blowing dust originating from the Imperial Sand Dunes.

The MODIS satellite data are from the Terra satellite with 250 meter resolution and use bands 7, 2, and 1 to accentuate vegetation. Lighter tan areas are indicative of open desert while darker brown areas indicate areas of higher elevation or differing soil type (compared to that of the open desert). The suspected PM sources are outlined in the image below.

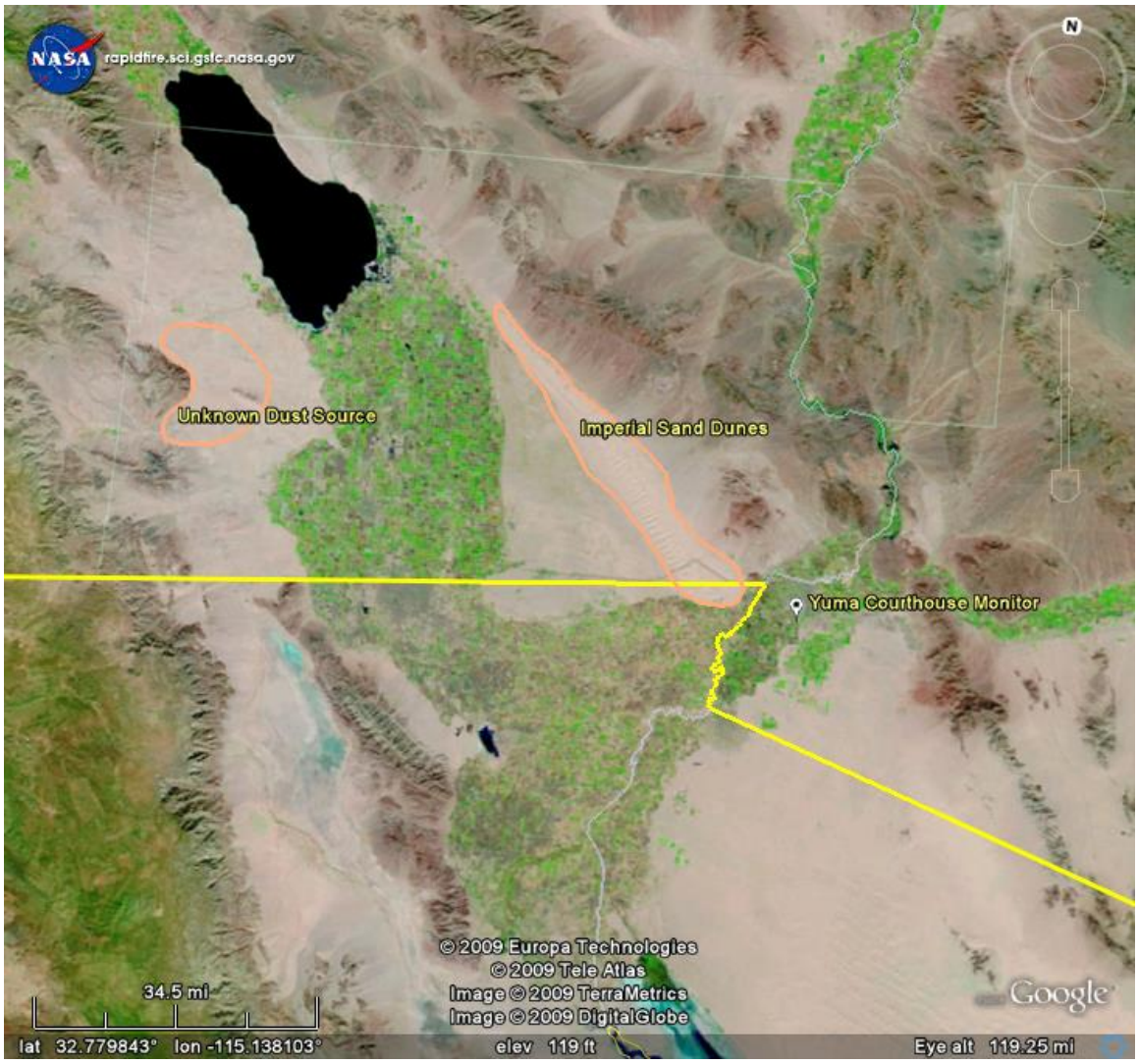


Figure 3 - Image courtesy of MODIS Rapid Response Project at NASA/GSFC displayed using Google Earth software.

PM_{10} Control Measures Reporting Form
High Wind Exceptional Event Demonstration

Date of Flagged Event June 4, 2008

PM_{10} Planning Area Maricopa County PM10 Nonattainment Area

Exceeding Monitor(s) Buckeye, Coyote Lakes, and West 43rd Monitors

AQI/High Wind/Dust Forecast (rolling three day forecast) Issued?

Yes	No
X	

Type: PM10 Health Watch (issued between 10 am and noon, same day)

In the spaces below, please provide information about the 72-hour period preceding the event, the day of the event, and the 72-hour period following the event. For a list of control measures for the planning area, see back of this form. Account for minimum 2 mile area around exceeding monitor(s). *Please attach additional information if necessary.*

Complaints:

No complaints for agricultural activities for all three areas during time frame, and two fields within radius of West 43rd and Durango monitors were *not* in crop production; no County complaints for **Buckeye area**; June 4th County complaint inspection of vacant lot for **Coyote Lakes** area; June 4th County complaint inspection_ of a dust control permit for **West 43rd** area.

Inspections:

June 4th four inspections of dust control permits under Rule 310 BACM measures for **Buckeye** area (no violations); June 2nd one inspection of Rule 316 point source for Rule 316 BACM measures for **Coyote Lakes** area (no violations); June 3rd three inspections of dust control permits for Rule 310 BACM measures, June 5th two inspections – one for a dust control permit for Rule 310 BACM measures and one for Rule 316 source (no violations), June 6th five inspections of dust control permits for Rule 310 BACM measures (no violations) all for **West 43rd** area.

Notices or Enforcement Actions:

None for **Buckeye** area; one 60-day letter for unstable vacant lot under Rule 310.01 for **Coyote Lakes** area; one NOV issued on June 4th for trackout under Rule 310 and one NOV issued on June 5th for failure to install a wheel washer under Rule 316 both for **West 43rd** area.

Regulating Agency(s) ADEQ (Agriculture); Maricopa County

Information Supplied By Emily Bonanni, ADEQ Planning Division, Compliance Section; Jo Crumbaker, Maricopa County Air Quality Department

Date Completed October 14, 2009

FOR INTERNAL PURPOSES ONLY
Reviewed by / date: _____

Measures included in the Maricopa County PM_{10} 5 Percent Plan
(25 committed measures in parentheses)

1. Extensive dust control training program (2).
2. Dust managers/Coordinators at earthmoving sites < than or equal to 5 acres (3,16).
3. Increase proactive Rule 310 and 316 inspections (9, 10, 44).
4. Strengthen Rule 310 to promote continuous compliance (36 thru 38, 28).
5. Conduct nighttime and weekend inspections (8).
6. Ban leaf blowers from blowing debris into streets (21).
7. Prohibit use of leaf blowers on unstabilized surfaces (45).
8. Implement a leaf blower outreach program (22).
9. Ban ATV use on high pollution advisory days (23).
10. Pave or stabilize existing unpaved parking lots (25).
11. Pave or stabilize unpaved road shoulders (28).
12. Strengthen and increase enforcement of Rule 310.01 for vacant lots (31, 32)
13. Recover costs for stabilizing vacant lots (33).
14. Restrict and enforce vehicle use/parking on vacant lots (31, 32).
15. Increase fines for open burning (34).
16. Restrict use of outdoor fireplaces/pits/ambience fireplaces (35).
17. Other wood burning restrictions in SB 1552 (47, 48).
18. Repave or overlay paved roads with rubberized asphalt (53).

Various additional SIP measures or sources:

1. Agriculture – Agricultural Best Management Practices (AgBMP) Program
2. Point sources – Permit Conditions (stack, fugitive, and area source emissions)
3. Rule 310 and 310.01; sand and gravel – Rule 316
4. Windblown, area sources – mobile, roadway, vacant lots, fires, et al.
5. Maintenance of micro-scale Salt River stabilization/improvement
6. Pave and stabilize public dirt roads and alleys
7. Covered loads
8. Registered subcontractors